

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:
Paul McGrane et al. : Group Art Unit: 1621
Application No.: 09/845,233 :
Filed: April 30, 2001 : Examiner:
For: Method For the Direct Esterification :
of Sorbitol With Fatty Acids : Deborah D. Carr
Confirmation No.: 4159

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

SECOND AMENDMENT AFTER FINAL REJECTION

Dear Sir:

This is a response to the Final Rejection dated January 25, 2006, in relation to the above-identified application. This response is considered timely by virtue of the prior filing of a petition for a 1-month extension of time filed along with payment of the associated extension fee of \$120.00 on May 3, 2006, and the concurrent filing of a petition for a 2nd month extension of time and payment of the associated extension fee of \$330.00 herewith.

A listing of Claims begins on page 2 of this paper.

Remarks/Arguments begin on page 7 of this paper.

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently amended) A process for preparing a mixture of sorbitol fatty acid esters and sorbitol anhydride fatty acid esters comprising the step of:

reacting a reaction mixture which is essentially free from water, comprising sorbitol and at least one free fatty acid which is essentially free of oxidative degradation products, wherein the molar ratio of free fatty acid to sorbitol is at least 7:1, at a temperature and for a time sufficient to effect an average degree of sorbitol hydroxyl substitution of from about 3 to about 5.5 fatty acid groups per sorbitol molecule, thereby forming an esterified reaction product mixture comprising sorbitol fatty acid esters and sorbitol anhydride fatty acid esters.
2. (Previously Presented) The process of claim 1, wherein said reaction mixture further comprises an esterification catalyst.
3. (Previously Presented) The process of claim 2, wherein said esterification catalyst is selected from the group consisting of alkali metal soaps, alkaline earth metal soaps, inorganic acids, carboxylic acids, polycarboxylic acids, and salts, oxides and hydroxides of alkali metals, alkaline earth metals, transition metals, aluminum, and zinc.
4. (Previously Presented) The process of claim 2, wherein said esterification catalyst is an alkali metal soap.
5. (Previously Presented) The process of claim 1, wherein said average degree of sorbitol hydroxyl substitution is about 4.0 to about 5.5 fatty acid groups per sorbitol molecule.
6. (Previously Presented) The process of claim 1, wherein the molar ratio of free fatty acid to sorbitol is from about 7:1 to about 15:1.

7. (Previously Presented) The process of claim 1, wherein the molar ratio of free fatty acid to sorbitol is from about 7:1 to about 12:1.
8. (Previously Presented) The process of claim 1, wherein said reaction mixture is reacted at a temperature of from about 170 to about 260°C.
9. (Previously Presented) The process of claim 1, wherein said reaction mixture is reacted at a temperature of from about 170 to about 190°C.
10. (Previously Presented) The process of claim 1, wherein said reaction mixture is reacted for a time of from about one half to about 24 hours.
11. (Previously Presented) The process of claim 1, wherein said reaction mixture is reacted for a time of from about 2 to about 8 hours.
12. (Previously Presented) The process of claim 4, wherein said alkali metal soap catalyst is formed *in situ* from an alkali metal compound and the at least one free fatty acid present in said reaction mixture.
13. (Previously Presented) The process of claim 4, wherein said alkali metal soap catalyst is formed prior to said reacting step in a preliminary step comprising heating a mixture of an alkali metal compound and at least one free fatty acid.
14. (Previously Presented) The process of claim 12, wherein said alkali metal compound is selected from the group consisting of potassium hydroxide, potassium carbonate, sodium hydroxide, sodium carbonate, sodium bicarbonate, and mixtures thereof.
15. (Previously Presented) The process of claim 13, wherein said alkali metal compound is selected from the group consisting of potassium hydroxide, potassium carbonate, sodium hydroxide, sodium carbonate, sodium bicarbonate, and mixtures thereof.

16. (Previously Presented) The process of claim 4, wherein said alkali metal soap catalyst is present in an amount ranging from about 0.3 mole to about 1.4 mole, per mole of sorbitol present in the reaction mixture.
17. (Previously Presented) The process of claim 1, wherein said at least one free fatty acid is selected from the group consisting of acetic, propionic, butyric, caproic, caprylic, pelargonic, capric, undecanoic, lauric, myristic, palmitic, oleic, elaidic, myristoleic, palmitoleic, ricinoleic, erucic, stearic, arachidic, behenic, linoleic, linolenic, eleostearic, arachidonic acids, and mixtures thereof.
18. (Previously Presented) The process of claim 1, wherein said at least one free fatty acid is obtained from non-hydrogenated, partially hydrogenated and hydrogenated oils selected from the group consisting of soybean oil, safflower oil, sunflower oil, sesame oil, peanut oil, corn oil, olive oil, rice bran oil, canola oil, rapeseed oil, shea nut oil, babassu nut oil, coconut oil, palm kernal oil, cottonseed oil, palm oil, cocoa butter, cohune oat, tacum ucuhuba, butterfat, tallow, lard, and mixtures thereof.
19. (Canceled)
20. (Previously Presented) The process of claim 1, wherein the reaction mixture further comprises an absorbent selected from the group consisting of activated carbon and clay.
21. (Previously Presented) The process of claim 1, further comprising the steps of:
 - separating unreacted free fatty acid from said esterified reaction product,
 - removing oxidative degradation products from the unreacted free fatty acid, and
 - recycling the unreacted free fatty acid free of oxidative degradation products to the reaction mixture.

22. (Previously Presented) The process of claim 21, wherein vacuum distillation is used to remove the oxidative degradation products from the unreacted free fatty acid.

23. (Currently amended) The process of claim 491, wherein the reaction products exhibit a Lovibond red scale color of about 5 or less.

24. (Currently amended) The process of claim 491, wherein the reaction products exhibit a Lovibond red scale color below about 1.5.

25. (New) A process for preparing a mixture of sorbitol fatty acid esters and sorbitol anhydride fatty acid esters comprising the step of:

reacting a reaction mixture which is essentially free from water, comprising sorbitol, at least one free fatty acid and an alkali metal soap esterification catalyst in an amount ranging from about 0.3 mole to about 1.4 mole, per mole of sorbitol present in the reaction mixture, wherein the molar ratio of free fatty acid to sorbitol is at least 7:1, at a temperature and for a time sufficient to effect an average degree of sorbitol hydroxyl substitution of from about 3 to about 5.5 fatty acid groups per sorbitol molecule, thereby forming an esterified reaction product mixture comprising sorbitol fatty acid esters and sorbitol anhydride fatty acid esters.

26. (New) The process of claim 25, wherein said alkali metal soap catalyst is formed *in situ* from an alkali metal compound and the at least one free fatty acid present in said reaction mixture.

27. (New) The process of claim 26, wherein said alkali metal compound is selected from the group consisting of potassium hydroxide, potassium carbonate, sodium hydroxide, sodium carbonate, sodium bicarbonate, and mixtures thereof.

28. (New) The process of claim 25, wherein said alkali metal soap catalyst is formed prior to said reacting step in a preliminary step comprising heating a mixture of an alkali metal compound and at least one free fatty acid.

29. (New) The process of claim 28, wherein said alkali metal compound is selected from the group consisting of potassium hydroxide, potassium carbonate, sodium hydroxide, sodium carbonate, sodium bicarbonate, and mixtures thereof.

30. (New) A process for preparing a mixture of sorbitol fatty acid esters and sorbitol anhydride fatty acid esters comprising the step of:

reacting a reaction mixture which is essentially free from water, comprising sorbitol, at least one free fatty acid and an absorbent selected from the group consisting of activated carbon and clay, wherein the molar ratio of free fatty acid to sorbitol is at least 7:1, at a temperature and for a time sufficient to effect an average degree of sorbitol hydroxyl substitution of from about 3 to about 5.5 fatty acid groups per sorbitol molecule, thereby forming an esterified reaction product mixture comprising sorbitol fatty acid esters and sorbitol anhydride fatty acid esters.

31. (New) A process for preparing a mixture of sorbitol fatty acid esters and sorbitol anhydride fatty acid esters comprising the steps of:

reacting a reaction mixture which is essentially free from water, comprising sorbitol and at least one free fatty acid, wherein the molar ratio of free fatty acid to sorbitol is at least 7:1, at a temperature and for a time sufficient to effect an average degree of sorbitol hydroxyl substitution of from about 3 to about 5.5 fatty acid groups per sorbitol molecule, thereby forming an esterified reaction product mixture comprising sorbitol fatty acid esters and sorbitol anhydride fatty acid esters;

separating unreacted free fatty acid from said esterified reaction product;

removing oxidative degradation products from the unreacted free fatty acid; and recycling the unreacted free fatty acid free of oxidative degradation products to the reaction mixture.

32. (New) The process of claim 31, wherein vacuum distillation is used to remove the oxidative degradation products from the unreacted free fatty acid.

REMARKS

Claim 19 has been canceled without prejudice to resubmission. Claims 1 and 23-24 have been amended. New claims 25-32 have been added. Upon entry of this amendment, claims 1-18 and 20-32 will be pending.

Allowable Subject Matter

The Examiner's indication that claims 16 and 19-24 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims is hereby acknowledged with appreciation.

The purpose of this amendment is to revise the claims to relate to only the subject matter that was indicated as being allowable by the Examiner in order to place the application in condition for immediate allowance. Accordingly, entry of this amendment to place the application in condition for allowance is requested.

The Claim Amendments

Claim 1 has been amended to insert the limitation of allowable claim 19 therein. Since allowable claim 19 depended only from claim 1, this amendment rewrites claim 19 in independent form including all of the limitations of base claim 1 and the limitations of claim 19. Accordingly, amended claim 1 is considered to be allowable since it is now of the same scope as previously allowable claim 19.

Claims 2-18 and 20-24 all depend directly or indirectly from amended claim 1 and thus are considered to be allowable for at least the same reasons as amended claim 1 since each of these claims incorporates all of the limitations of amended claim 1 therein.

New claim 25 is previously allowable claim 16 rewritten in independent form. Thus, new claim 25 rewrites claim 16 in independent form including all of the limitations of base claim 1, the limitations of intervening claims 2 and 4, and the limitations of claim 16 therein. Accordingly, new claim 25 is considered to be allowable since it is the same scope as previously allowable claim 16.

New claims 26-29 all depend directly or indirectly from new claim 25 and thus are considered to be allowable for at least the same reasons as new claim 25 since each of these claims incorporates all of the limitations of new claim 25 therein.

New claim 30 is previously allowable claim 20 rewritten in independent form. Thus, new claim 30 rewrites claim 20 in independent form including all of the limitations of base claim 1, and the limitations of claim 20, therein. Accordingly, new claim 30 is considered to be allowable since it is the same scope as previously allowable claim 20.

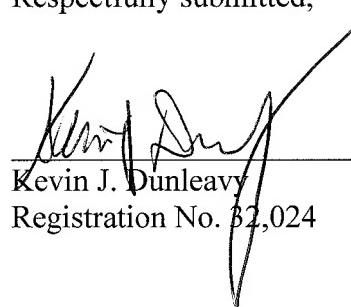
New claim 31 is previously allowable claim 21 rewritten in independent form. Thus, new claim 31 rewrites claim 21 in independent form including all of the limitations of base claim 1, and the limitations of claim 21, therein. Accordingly, new claim 31 is considered to be allowable since it is the same scope as previously allowable claim 21.

New claim 32 depends from new claim 31 and thus is considered to be allowable for at least the same reasons as new claim 31 since new claim 32 incorporates all of the limitations of new claim 31 therein.

Favorable consideration and issuance of a Notice of Allowance is requested.

The Commissioner is authorized to charge any additional fees associated with this response or credit any overpayment, to Deposit Account No. 50-0462.

Respectfully submitted,



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